

## CH 701: Analytical Methods in Chemistry (3-0-0: 3)

### Statistical Analysis- Evaluating Data

Significant figures, types of error, sources of errors and their effect upon the analytical results, precision, accuracy, mean deviations and standard deviation, statistical treatment of analytical data, method of least squares and methods for reporting analytical data.

### Thermal Methods

Theory, instrumentation and applications of thermogravimetric analysis (TGA), differential thermal analysis (DTA), differential scanning calorimetry (DSC), thermometric titrations.

### Separation Methods

An introduction to chromatographic separations; gas chromatography: gas chromatographic columns and stationary phases, principles and applications of gas-liquid chromatography; high-performance liquid chromatography (HPLC); thin layer and column chromatography; ion-exchange chromatography; size-exclusion chromatography.

### Optical Methods

Atomic absorption spectroscopy, steady state and time resolved fluorescence spectrometry, linear and circular dichroism, X-ray methods: X-ray absorption and X-ray diffraction, photoelectron spectroscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM) and Raman spectroscopy.

### Structure Elucidation

Principles of UV-vis, IR, NMR and mass spectroscopy, structure elucidation of inorganic and organic molecules using spectroscopic methods.

### References:

1. R. M. Silverstein, F. X. Webster, D. J. Kiemle and D. Bryce, "Spectrometric Identification of Organic Compounds", John Wiley & Sons, 8<sup>th</sup> Edition, 2015.
2. D. A. Skoog, F. J. Holler and S. R. Crouch, "Principles of Instrumental Analysis", Cengage Learning, 7<sup>th</sup> Edition, 2017.
3. W. Kemp, "Organic Spectroscopy", Palgrave Macmillan, 3<sup>rd</sup> Edition, 2008.
4. J. Rousseau, "Basic Crystallography", John Wiley & Sons, 1<sup>st</sup> Edition, 1998.
5. G. D. Christian, "Analytical Chemistry", Wiley India, 6<sup>th</sup> Edition, 2007.
6. H. H. Willard, L. L. Merritt and J. A. Dean, "Instrumental methods of analysis", CBS Publishers & Distributors Pvt. Ltd, 7<sup>th</sup> Edition, 2004.